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The Design of Decision Support System in Identifying The Priority Indicator of Sustainability Performance in Islamic Banking Based on Analytical Hierarchy Process (AHP) Approach

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ABSTRACT

Islamic banking has grown very rapidly throughout the world. Due to the lack of eficiency and quality in operational services, human resources and technology supported the growth of islamic banking come down.The Islamic banking conducts its business based on the basic philosophy of the Quran and Sunnah is strongly associated with the concepts of sustainability on how to build a society in which economic, social and ecological objectives must be balanced. Performance measurement system development requires the dynamic and balanced system in transcribing complex and huge information in terms of AHP as one of Multi Attribute Decision Making (MADM) approach. This approach qualitative and quantitative provides the weight priority of attribute pairwise comparison.The weight of 33 performance criteria will then be used as priority consideration for decision maker in measuring the islamic banking sustainability performance.Thus Islamic banking in Indonesia can customize their sustainability performance indicators based on their target focus organization. As the result a design of AHP-decision support system for islamic sustainability performance is developed. The design provided gap analysis between the standarized and personnally banking performance and proposed several recommendations and suggestions as corrective action to managers in ensuring they achieve the appropriate sustainability of islamic banking performance.

Typeof Paper: Empirical

Keywords: *Decision Support System, Analytical Hierarchy Process, Multi Attribute Decision Making, Sustainability Performance, Islamic Banking*

1. Introduction

Sustainability practices become a major competitive factor for survival in a competitive environment (Bevilacqua et al., 2007; Nambiar, 2010). In this case, corporate sustainability is considered a business and investment strategies that seek to use best business practices to meet and balancing stakeholder needs of current and future (Report of the United

Nations Worlds Commission on Environment and Development was quoted by Artiach et al, 2010). The development of these sustainability issues, making the company a lot of pressure from various stakeholders not only in terms of financial companies, but also the management and corporate responsibility in terms of both positive and negative social and environmental. It is manifested in the form of sustainability reporting sustainability report, contain the financial, environmental and social aspects. Due to this problem, the company needs to make an assessment of sustainability company performance in order to determine the extent to which the company had made the responsibility of these three aspects. Later, it becomes the responsibility for the company to publish its sustainability report for the stakeholders. In Islamic banking, social responsibility is very relevant to consider due to several factors; Islamic banking is based on sharia asking them to operate with the foundation of morals, ethics, and social responsibility, principles upon obedience to the commandments of God and the caliph, and the principle of public interest, consists of avoidance of decay and poverty (Rifqi et al, 2009).

Corporate Social Responsibility (CSR) or Corporate Sustainability can be understood as a concept that integrates social, environmental and economic diberhubungan strategy and decision-making (Garcia-Benau, Sierra-Garcia, and Zorio, 2013). Wilson (2003) suggest that CSR is a management paradigm and Fernandez and Souto (2009) states that CSR as an effective management tool, which offers confidence to stakholders as an organization that is responsible and reliable. As a consequence, organizations must redefine the company's goals closely in responding to social expectations of society (Garcia-Benau, Sierra-Garcia and Zorio, 2013). Social Responsibility (SR) is also used to assess the performance of the organization as a social, environmental and economic issues and communicate the processes and progress to the stakeholder activities. This indicates that the measurement of performance and CSR or Sustainability Report involved separately but have a common especially in terms of orientation at the strategic level that supports the management in decision-making activity and contribute to the creation of value.

The most important thing in building a performance measurement system is decision making processes related to the collection, elaboration and analysis of information (Neely et al., 2002). Lack of decision maker ability in transcribing complex and huge information will trigger the missing and bias decision making. AHP is one of Multi Attribute Decision Making (MADM) approach that can be used to identify the priority and significance analysis of criteria in performance measurement (Saaty, 1994). Several application of AHP in MADM including Automobile Industry Decision Making (Marcia et.al., 2013); Multimedia Authorizing Systemin Group Decision Making (Vincent et.al., 2002); Software Selection (Srdevic et.al, 2011); Decision Making in Engineering Education (Kousalya et.al., 2012) and Security Policy Decision Making (Irfan dan Junseok, 2009). This research answers the question on how to design a decision support system in identifying the priority indicator of sustainability performance islamic banking through the application of AHP. A system design can be used as guide for management leadership in making decision and conducting corrective actions in Islamic Banking Sustainability Performance. Moreover, this design can be used as a tool for goverment in measuring the Islamic Banking Sustainability in Indonesia. This triggers the effectiveness and eficiency of sustainability in Indonesia Banking.

2. Theory Background

2.1. Sustainability Performance Indicators in Islamic Banking

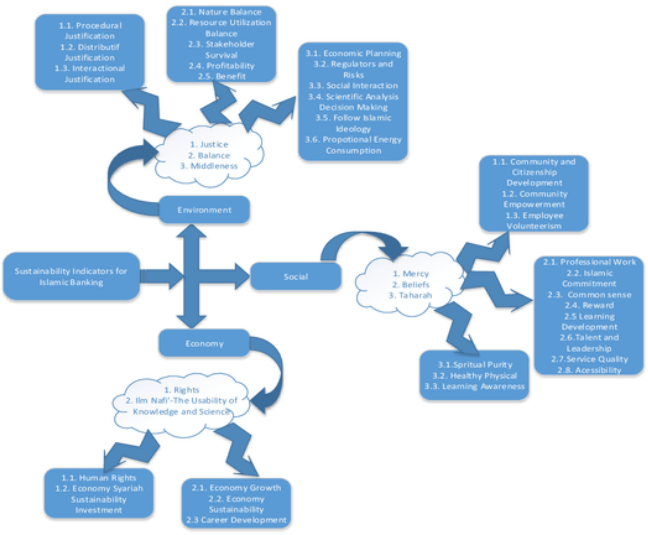

Figure 1: Sustainability Performance Indicators in Islamic Banking

Based on the interviews of several top and middle managers in Indonesia Islamic Bank thus are strenghted by literature reviews, the sustainability performance indicators were performed in Figure 1. It is including:

- Environment
  To describe islamic banking sustainability in environment three main principle indicators (Abdul-Matin, 2010; Ingar, 2008). The first is the principle of justice (Hichem, 2013;) viz. procedural justification, distributif justification and interactional justification. The second is the principle of Mizan or Balance viz. Nature of balance, the balancing in resource utilization, stakholder survival and the profitability balancing (Rafika, 2012). Finally is the principle of Wasat or middleness viz. Middleness in economy planning, facing regulators and risks, middleness in social interacton, scientific analysis decision making (Bin Ibrahim, 2009), following islamic ideology (Ingar, 2008; IFSB-3, 2006) and propotional energy consumption.
- Social
  Performance islamic banking sustainability in social can be described through three main principle indicators (Abdul-Matin, 2010) including the principle of mercy, principle of beliefs and principle of taharah. The principle of mercy is embodied in the form of i.e., community and citizenship development, community empowerment and employee volunterism. The principle of Beliefs is embodied in the form of professional work, islamic commitment, common sense, rewards, learning development, talent and leadership, service quality and accessibility. The latest principle is Taharah or Spritual Purity viz. Healthy Physical and Learning awarness.
- Economy
  Economy Islamic Banking sustainability is performed by two mains principles (Abdul-Matin, 2010) including Rights and IlmNafi' or the usability of knowledge and science. The principle of Rights i.e., Human rights, economic syariah sustainability investement. Meanwhile, the usability of knowledge principle is

embodied in form of Economic growth, economy sustainability and career development (Nurul and Fariastuti, 2013).

2.2. AHP MADM

Decision making is a process in analyzing several alternatives or information in order to obtain one or more target achievements (Turban, 2005). Decision Support System is a computer base that provides alternatives decision to aid management level in solving the structure and un-structure problem through the application of data and model (McLeod, 2004). Turban (2005) described decision support system components in Figure 2 viz. Data Management System including Database Management System (DBMS); Model Management System (including financial, statistics, management science, quantitative model or any analysis and management software platform); Knowledge Management Subsystem (optional and independence subsystem); User Interface Subsystem as a communication media between system and user. The latest component is User as actors of decision making. It is including decision maker, manager, user/adminitratior. Observing more detail in Model management system components. AHP as one of Multi Atribute Decision Making can be used as decision making techniques to solve complex, unstructured and contain multiple attributes. The decisions do not fit linear framework, contain both physical and physichological elements (Sam, 2005) thus can be quantified and subjective judgement of the decision maker measurement. In the fied of project management, the meaning of performance measurement is to assess deminsion of meeting design goals, benefits to the stakeholders involved, organization to defense crucial citeria of performance measurement in achieveing the project success (Hsin and Sheng, 2009). Although many models and frameworks have been applied in examining the performance measurement such as comparative method, scoring method, economic analysis, cost benefit analysis and decision tree analysis, it is found the lacking of criteria election analysis which provides the right reasons and alternatives for decision making problems. Herein, AHP (Hsin and Sheng, 2009) is applied to present a hierarchy structure for the performance criteria of islamic banking sustainability into a design of decision support system as tool to aid management level in decision making.

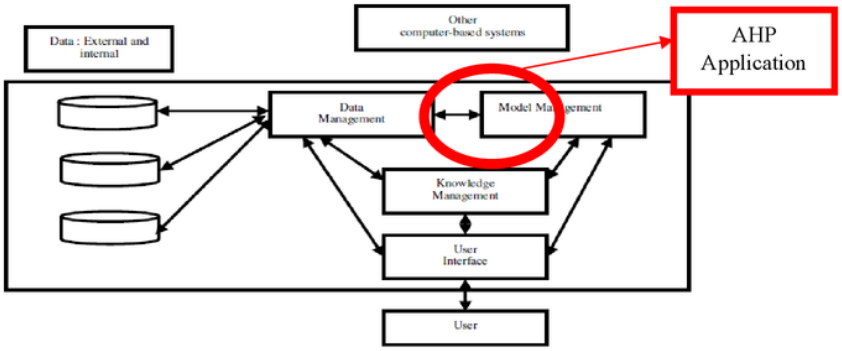

Figure 2 : Decision Support System Component by Turban, (2005).

3. Methods

Based on the objectives of this research is to Apply AHP approach on decision support system design for identifying the priority of Islamic Banking Sustainability Performance indicators. There are two main phases conducted in reseach schema as followings:

- Phase 1 consists of Stage 1: Problem Identification through literature review and interview. As the result, a conceptual framework is produced (See Figure 1). Stage 2 Instruments development for surveying the respondents agreement and analyzing on

indicators, level importance and presence of indicators. The survey will be conducted in 5 islamic banking in Indonesia, including Bank Mandiri Syariah, Bank Muamalat Indonesia, Bank BRI Syariah, Bank Riau Kepri Syariah dan Bank BNI Syariah. Stage 3 Indicator Validation through the application of AHP approach, Indicator analysis; Construct the hierarchy structure; Establish the paired metrices for comparison; Calculate eigenvector; Consistency test and Normalization. As an output, the validated AHP framework is proposed.

- Phase 2 consists Stage 4 A Design of Decision Support System AHP. System development applies the waterfall software life cycle concepts on Decision Support System Components (Turban, 2005)-Data external and internal; Data management; Model management; Knowledge Management; User Interface and User definition which is combining with AHP Concept model.

4. Results and Findings

4.1.Validated AHP Framework

As the result of AHP analysis, the values of eigen vector can be seen in Table 1. The dominant indicators in the structured criteria includes Environment (0.4174), Social (0.3554) and Economy (0.2270) respectively. For the Sub criteria of Environment includes Balance (0.3806), Middleness (0.3777) and Justice (0.2416) respectively. Sub criteria Social, the priority eigen vector values of sub-indicators includes Mercy (0.4413), Taharah (0.3102) and Beliefs (0.2483). Finally, the sub-criteria of Economy, the priority eigen vector values of sub-indicators includes Rights (0.5454) and Ilm Nafi'-The Usability of Knowledge and Science (0.4545) respectively. Consistency Index (CI) and Consistency Ratio (CR) values are less then 10% (See Table 2). It showed that these criteria can be accapted. The validation of restructured criteria and sub criteria of this AHP Framework has been established and ready to be used as measurement tool of Islamic Banking Sustainability Performance.

4.2.A Design of Decision Support System-AHP

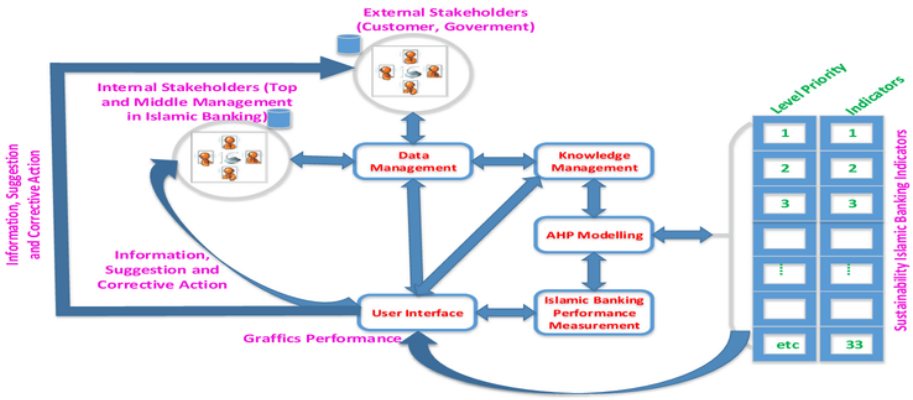

Figure 3. A Design of Decision Support System-AHP Modelling

Based on AHP analysis and be complemented by Decision Support System (DSS) Components, a design of DSS-AHP modelling is described in Figure 3. There are 5 mains components in designing DSS-AHP inlcuding Data Management, Knowledge Management, AHP Modelling, Islamic Banking Performance Measurement and User Interface. Data Management provides data and information captured on indicators, priority and standarized from many resources including internal (Top and middle managers in islamic banking) and

external stakholders (Customer and Goverment) through dissemination of questionnaires and interviews.

Tabel 1. Indicators Priority Eigen Vector Values

No	Criteria	Eigen Vector	No	Sub Criteria	Eigen Vector	No	Sub-sub Criteria	Eigen Vector	No	Criteria	Eigen Vector	No	Sub Criteria	Eigen Vector	No	Sub-sub Criteria	Eigen Vector
1	Environment	0.4174	1.1	Justice	0.2416	1.1.1	Procedural Justification	0.4052									
						1.1.2	Distributif Justification	0.3762				2.2	Beliefs	0.2483	2.2.1	Professional Work Islamic	0.1289
						1.1.3	Interactional Justification	0.2184							2.2.2	Commitment	0.0873
			1.2	Balance	0.3806	1.2.1	Nature Balance Resource Utilization	0.2884							2.2.3	Common Sense	0.1662
						1.2.2	Balance Stakehlders	0.1674							2.2.4	Reward Learning	0.1262
						1.2.3	Survival	0.2789							2.2.5	Development Talent and	0.1089
						1.2.4	Profitability	0.1462							2.2.6	Leadership	0.1031
						1.2.5	Benefit	0.1189							2.2.7	Service Quality	0.1223
			1.3	Middleness	0.3777	1.3.1	Economic Planning Regulators and	0.1971							2.2.8	Accessibility	0.1567
						1.3.2	Risks	0.1700				2.3	Taharah	0.3102	2.3.1	Spritual Purity	0.4386
						1.3.3	Social Interaction Scientific Analysis Decision	0.2210							2.3.2	Healthy Physical Learning	0.2702
						1.3.4	Making Follow Islamic	0.1794							2.3.3	Awareness	0.2910
						1.3.5	Ideology Propotional Energy	0.08									
						1.3.6	Consumption	0.1523									
2	Social	0.3554	2.1	Mercy	0.4413	2.1.1	Community and Citizenship Development	0.3656	3	Economy	0.2270	3.1	Rights	0.5454	3.1.1	Human Rights Economic Syariah	0.6
						2.1.2	Community Empowerment	0.3323							3.1.2	Sustainability Investment	0.4
						2.1.3	Employee Volunteerism/Employee Engagement	0.3020				3.2	(In)Nafi The Usabi lity of Knowledge and Science	0.4545	3.2.1	Economic Growth	0.3500
															3.2.2	Economy Sustainability	0.4256
															3.2.3	Career Development	0.2243

Tabel 2. Consistency and Normalization of Indicators

No	Indicators	λ max	CI	CR	No	Indicators	λ max	CI	CR
1 2 3	Environment Social Economy	3.00005	0.0002	0.0004	2.2.1 2.2.2 2.2.3 2.2.4 2.2.5 2.2.6 2.2.7 2.2.8	Professional Work Islamic Commitment Common Sense Reward Learning Development Talent and Leadership Service Quality Accessibility	8.9558	0.13655	0.0968
1.1 1.2 1.3	Justice Balance Middleness	3.0536	0.0268	0.0462	2.3.1 2.3.2 2.3.3	Spritual Purity Healthy Physical Learning Awareness	3.0055	0.0027	0.0047
1.1.1 1.1.2 1.1.3	Procedural Justification Distributif Justification Interactional Justification	3.0055	0.0027	0.0047	3.1 3.2	Rights (In)Nafi'-The Usability of Knowledge and Science	2	—	0
1.2.1 1.2.2 1.2.3 1.2.4 1.2.5	Nature Balance Resource Utilization Balance Stakehlders Survival Profitability Benefit	5.0823	0.0205	0.0183	3.1.1 3.1.2	Human Rights Economic Syariah Sustainability Investment	2	0	0
1.3.1 1.3.2 1.3.3 1.3.4 1.3.5 1.3.6	Economic Planning Regulators and Risks Social Interaction Scientific Analysis Decision Making Follow Islamic Ideology Propotional Energy Consumption	6.0297	0.0059	0.0052	3.2.1 3.2.2 3.2.3	Economic Growth Economy Sustainability Career Development	3.0396	0.0198	0.0341
2.1 2.2 2.3	Mercy Beliefs Taharah	3.0512	0.0256	0.0441	2.1.1 2.1.2 2.1.3	Community and Citizenship Development Community Empowerment Employee Volunteerism/ Employee Engagement	3.0092	0.0046	0.0079

Several banking documents and goverment regulations related to sustainability of islamic banking are enriched data management process. Meanwhile, on the Knowledge Management stage management rules of data from Data Management will perform an expert system mechanism that provides the rulebase and data analysis on sustainability of islamic banking. In AHP Modelling, the identification of level priority through vector eigen and CI and CR values for each indicators is defined. These above values are used to define the standarized and maximal values of islamic banking sustainability performance measurement. Personally banking performance is flexible defined based on target and objectives achievement of each banking. There are 33 indicators that are ranked based on level priority values. In order to see the gap analysis between the standarized and personnally banking performance, Islamic Banking Performance Measurement Stage is conducted. From this, the lacking performance can be identified and analyzed. The recommendation and suggestion as corrective action will be proposed to top and middle managers in ensuring they achieve the right sustainability of islamic banking performance. User Interface stage is media for user in managing data, performing knowledge management and measuring the islamic bangking performance.

4. Conclusions, Implications and Significance

As conclusion, A design of decision support system is succesfully developed. The application of AHP in solving the problems on priority selection of sustainability performance indicators is well implemented. This design not only provides AHP analysis but also the company recomendations as suggestions and corrective actions. An ideal sustainability performance indicators ranking as well as customization indicators that based on target and focus achievement is also mechanismed in this system. As theoretical, this research combines three field of research i.e. Sustainability Performance Indicators, AHP analysis and MADM. This research explores the linkage of the theories above which emphasizes on the development of uniquely a Design of Decision Support System. As practical, the development of this system increases the effective used of indicators towards the successfull of sustainability reporting. A system design can be used as guide for management leadership in making decision and conducting corrective actions in Islamic Banking Sustainability Performance. Moreover, this design can be used as a tool for goverment in measuring the Islamic Banking Sustainability in Indonesia. This triggers the effectiveness and eficiency of sustainability in Indonesia Banking. The dynamic ecosystem which responsive and adaptive in facing the sustainability changes and challanges will be developed.

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